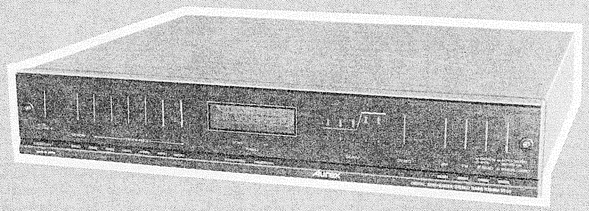
SERVICE DATA
FILE NO. 170-120

TOSHIBA

DIGITAL SYNTHESIZER TUNER

ST-55



SPECIFICATIONS

■ General Data

Power supply:	220V ∿ 50 Hz for Europe 240V ∿ 50 Hz for United Kingdom & Australia
Power consumption:	18W
Dimensions:	W420 x H78 x D433mm
Weight:	3.7 kg

■ Tuner

Frequency range:	FM: 87.5 ∿ 108 MHz (0.05 MHz step) AM: 522 ∿ 1602 KHz (9 KHz step)
Memory:	6 Channels each band
Functions:	Manual Tuning Up/Down Auto Tuning Up/Down

■ FM Tuner Section

Sensitivity (IHF):	3 μV (14.8 dBf)
Harmonic distortion:	1 KHz MONO 0.15% (IF WIDE) STEREO 0.3% (IF WIDE)
S/N:	MONO 75 dB (IHF A NET WORK) STEREO 68 dB (IHF A NETWORK)
Frequency Response:	30 ∿ 15,000 Hz ± 1.0 dB
Selectivity (IHF):	65 dB (± 300 KHz)
Image Rejection:	60 dB
IF Rejection:	90 dB
Capture Ratio:	1.5 dB
Spurious Response:	70 dB
AM Suppression:	55 dB
Stereo Separation:	40 dB (at 1 KHz)
Output:	0 ∿600mV (400 Hz 100% Mod)

■ AM Tuner Section

Sensitivity:	300 μV/m
Selectivity:	30 dB
Image Rejection:	40 dB
S/N:	50 dB

Specifications subject to change without notice.

TE, TU, AY

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Note: In order to retain the contents of the memory, a small electric current flows through the unit even when the function switch is turned to stand by mode. When the unit is not used for a long period of time, it should be unplugged. If there is a power supply interruption of more than one day, the pres-set information in the memory will be lost. If the contents of the memory are lost, the information must be re-set. To prevent loss of the memory contents do not unplug the power cord or turn off the switch at the wall socket for any length of time during normal use.

1. OPERATING CONTROLS

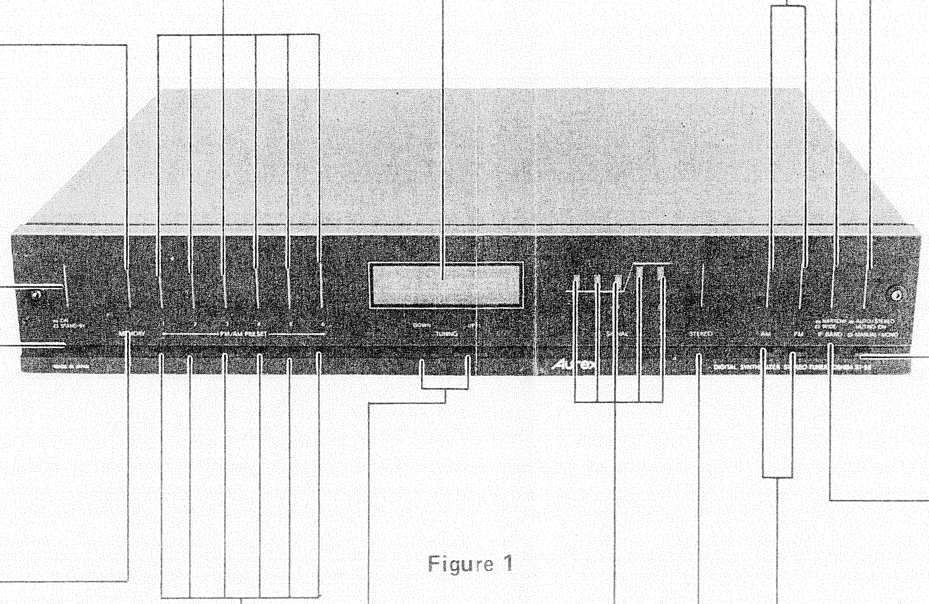


Figure 1

① **Frequency display**
The tuned frequency (AM or FM) is displayed here in digital form.

② **Channel indicator**
Indicates the channel selected by preset tuning.

③ **Memory indicator**
Depressing memory button ⑥ causes this indicator to light (red). The frequency of the station presently tuned is entered into the memory by pressing one of the preset tuning buttons while this indicator is lit. Memory storage is not possible after the indicator goes out.

④ **Power Indicator**

⑤ **Function Switch**
Depress this switch to turn the power on, depress once more to place the set in stand-by mode. When the function switch is turned on, a frequency will immediately appear in the display. This is the frequency of the last tuned station prior to placing the set in the stand-by mode.

⑥ **Memory button**
Press this button after having tuned to the desired station, then immediately press the desired Preset tuning button ⑦ to enter the frequency in that channel. Memory storage is possible only during the period of time the Memory indicator ③ is lit, therefore it must be determined beforehand in which preset tuning channel the station is to be entered. If you are too late, press this button again to obtain another several seconds for performing memory storage operations.

⑦ **Preset tuning buttons**
Once the memory button ⑥ has been pressed, press one of these buttons immediately afterward to store the frequency of the desired station in the memory. To recall the frequency later, simply press the corresponding Preset tuning button.

⑧ **Auto stop level control**
This controls the reception sensitivity during auto tuning. Turn in the LOCAL direction to receive only strong local stations during automatic tuning and in the DX direction to allow the auto tuning circuit to pick up increasingly weaker broadcasts.

⑨ **Tuning buttons**
Depress the UP button to move the frequency higher and the DOWN button to move the frequency lower. Refer to the section on tuner operation for details.

⑩ **Output level control**

⑪ **AM/FM indicator**

⑫ **IF band indicator**
Lights when the IF band switch is in the NARROW position.

⑬ **Mode indicator**
Lights when the Mode switch is in the AUTO/STEREO position.

⑭ **Mode switch**
In the AUTO/STEREO position (▬) the muting circuitry suppresses inter-station noise and FM reception in stereo is possible. Set to this position for auto-tuning. Tuning will automatically stop at those stations with a strong broadcast signal. Press the Tuning button ⑨ again to move to the next station. In the MANUAL/MONO position (■) even FM stereo broadcasts will be produced in monaural and Inter-station muting will not function. Use this position to manually tune stations with a weak signal that the muting circuit may suppress.

⑮ **IF band switch**
During FM reception, place this switch in the (■) WIDE position for standard wide zone, low distortion reception. If signals from other stations are mixed with the broadcast you want to hear, switch to the (▬) NARROW position for high selectivity reception.

⑯ **AM/FM switch**
AM: For AM broadcasts.
FM: For FM broadcasts.

⑰ **FM stereo indicator**
Lights when an FM broadcast is being received in stereo.

⑱ **Signal level**
These LED lamps light up from left to right, the stronger stations being indicated by more lamps. If the FM stereo indicator ⑰ fails to come on when a local FM stereo broadcast is received, check antenna connections and direction.

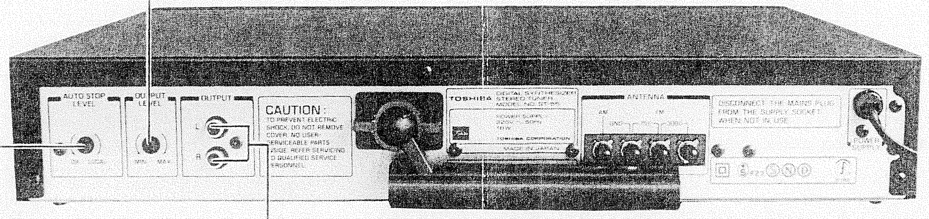
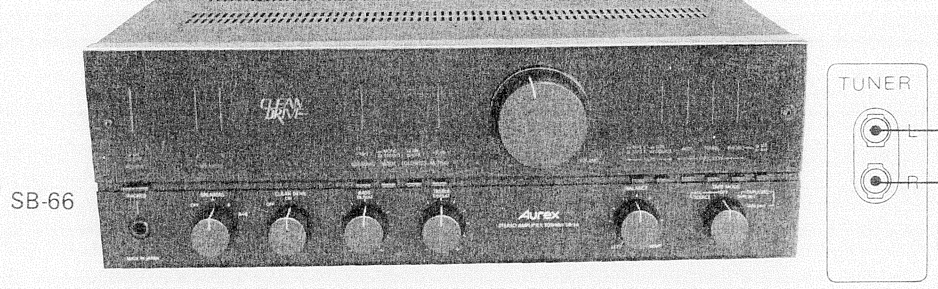
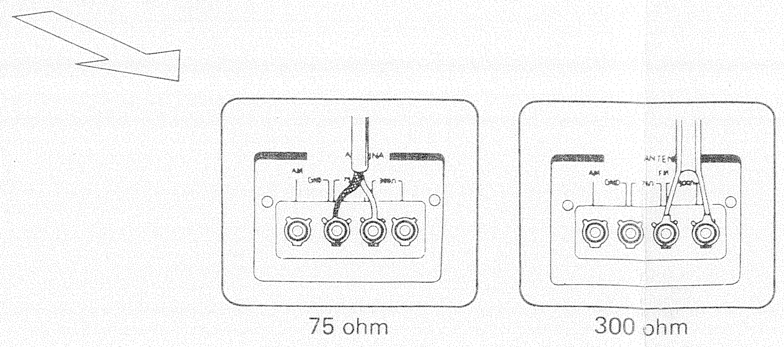


Figure 2





2. CONNECTIONS

(1) If your aerial is 300 ohms, connect it to the 300 ohm terminals. Use the 75 ohm terminals for a 75 ohm aerial.

(2) For AM reception, pull the bar antenna away from the back of the set and try several different positions for best reception.

(3) Connect the output leads to the input terminals of your amplifier, making sure the L and R cables are not reversed.

(4) All connecting cables and power cords should be kept away from the bar antenna on the rear panel to avoid induction noise.

3. TUNER OPERATION

- **Auto Tuning**

Depress the AM or FM switch ⑯
Place the Mode switch ⑭ in the AUTO position (▃) and press the UP or DOWN Tuning button ⑨. The frequency will automatically increase or decrease until a broadcasting station of sufficient strength is picked up. The threshold strength can be raised or lowered by adjusting the Auto stop level control ⑧

- **Manual Tuning**

Placing the Mode switch in the MANUAL position (▇) and pressing the UP or DOWN Tuning button ⑨ will increase or decrease the frequency in increments of 0.05 MHz for FM and 9 KHz for AM as long as the button is pressed down. When the frequency display reaches the desired station frequency, release the button to stop tuning.

- **Preset Tuning**

The major feature of the ST-55 is the digital synthesizer tuner section and the capacity to memorize six separate stations in each of the two bands (total of 12 stations). Once a station is preset in the Memory, it may be tuned accurately and immediately whenever desired by a single pushbutton operation.

(1) First check the official broadcasting frequencies of the desired stations (up to 6 stations in each band), or simply tune directly to the stations as described in the procedures above.

(2) When it is certain that the station is precisely tuned, press the Memory button ⑥, then immediately press the desired Preset tuning button ⑦. After the Memory indicator ③ is extinguished, memory setting operation will not be possible. This is to prevent any mistaken memory entries.

(3) Repeat the above procedure for all other stations to be entered into memory (maximum of 6 stations per band).

(4) Any of these preset stations may then be tuned in again by simply pressing the memory button where the station is stored.

NOTE: In case of a power failure of over 1 day duration, memory contents will be lost and the stations will have to be re-stored in memory.

4. DISASSEMBLY INSTRUCTIONS

REMOVAL OF TOP COVER

1. Remove two screws (A) (3φ x 6mm) from both sides of top cover as shown in Figure 3.
2. Remove three screws (B) (3φ x 6mm) from back side of top cover, then top cover can be removed as shown in Figure 4.

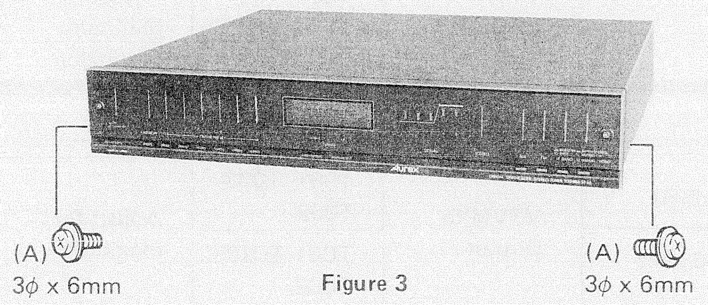


Figure 3

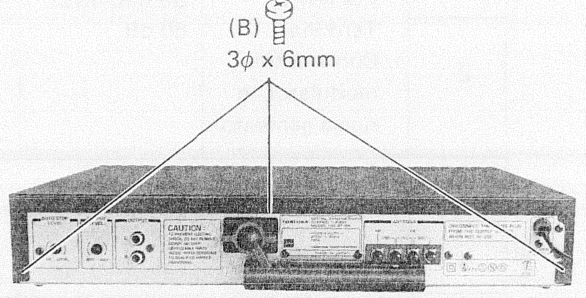


Figure 4

REMOVAL OF FRONT PANEL

1. Remove top cover as shown in Figures 3 and 4.
2. Remove three screws (C) (3φ x 8mm) holding front panel and back plate as shown in Figure 5.

REMOVAL OF BOTTOM PLATE

1. Remove five screws (D) (3φ x 8mm) holding bottom plate can be removed from the unit and P.C. Board can be checked easily as shown in Figure 5.

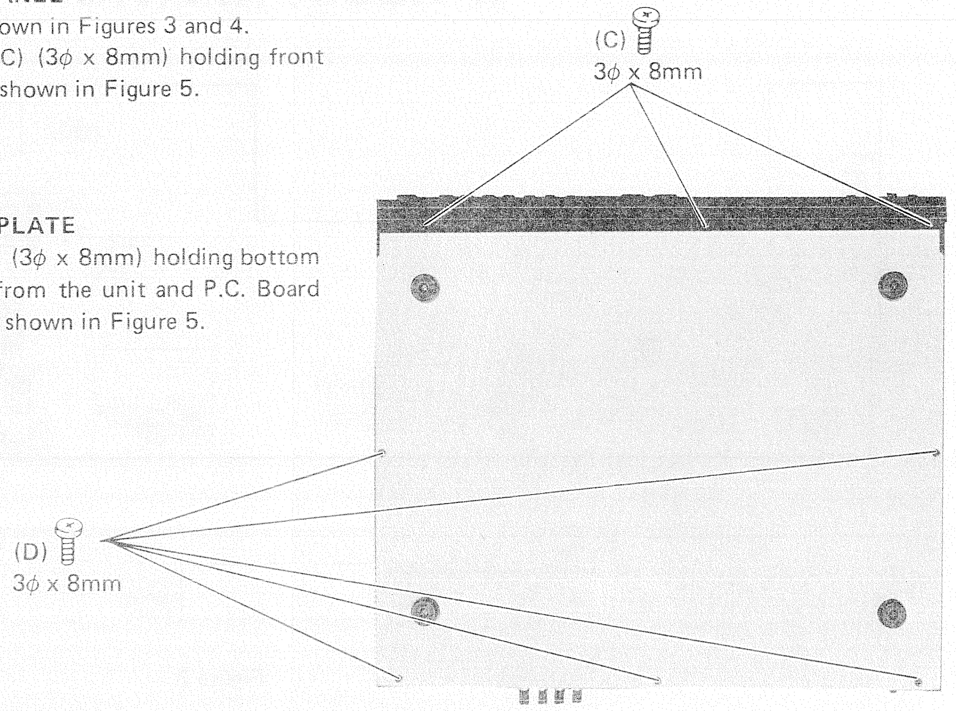


Figure 5

REMOVAL OF MAIN P.C. BOARD

1. Remove six screws (E) (3φ x 10mm) of P.C. Board holding panel and the claw (F) holding P.C. Board, then MAIN P.C. Board can be removed from Panel as shown in Figure 6.

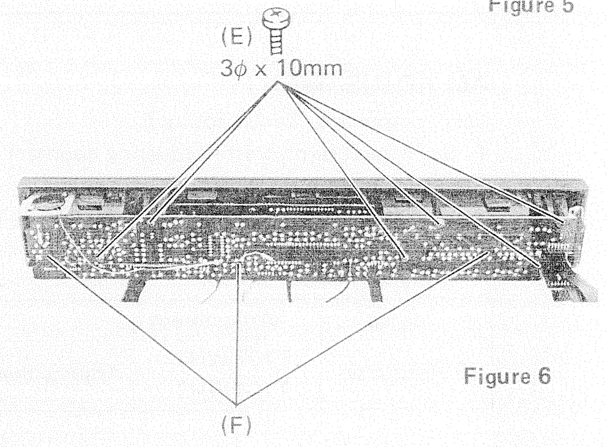


Figure 6

5. ADJUSTMENTS

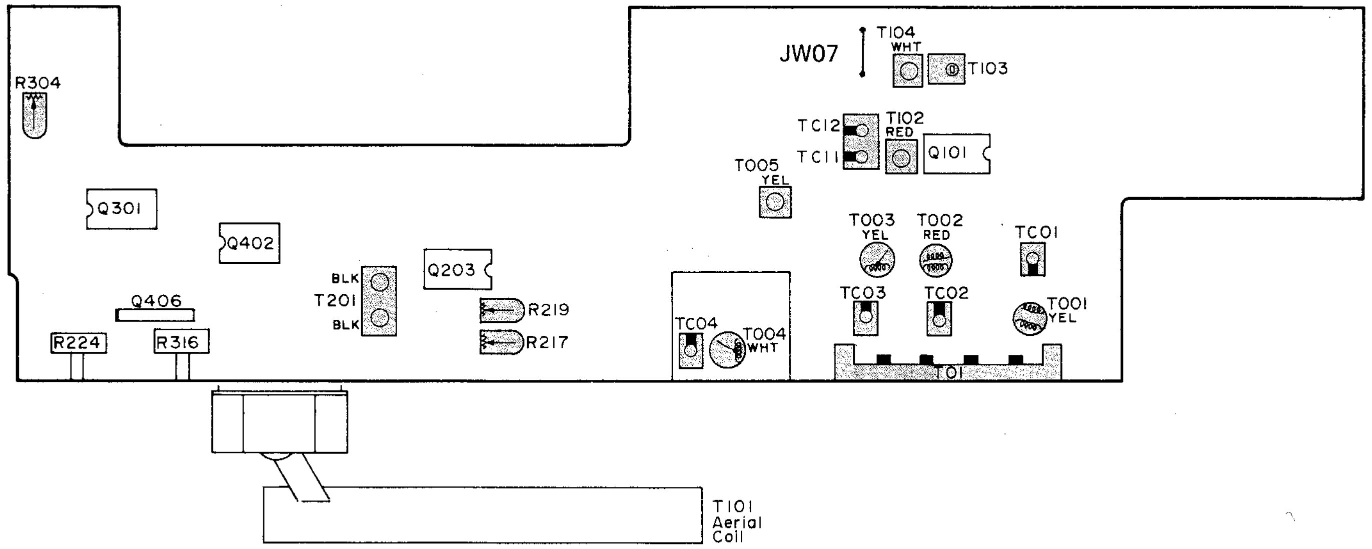

JW07
T104
WHT
T103
TC12
T102
RED
TC11
Q101
T005
YEL
T003
YEL
T002
RED
TC01
R304
Q301
Q402
Q203
BLK
T201
BLK
R219
R217
Q406
R224
R316
TC04
T004
WHT
TC03
TC02
T001
YEL
T01
T101
Aerial
Coil

Figure 7

AM ADJUSTMENT

Test equipments/Tools required

1. Signal generator (with frequency counter)
2. Sweep generator
3. Test loop Aerial
4. Adjusting screwdriver
5. Oscilloscope

IF ADJUSTMENT

Step	Adjustment	Remarks
IF Response	T103 WHT T104 WHT	Adjusts the scope pattern with specified marker (450 kHz) as illustrated in Fig. 8.

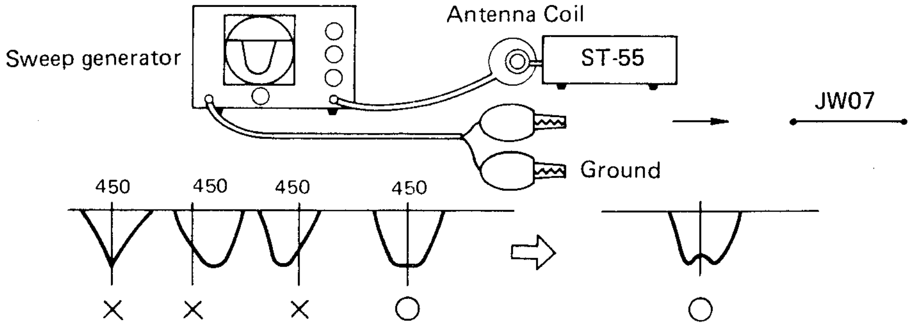

Sweep generator
Antenna Coil
ST-55
JW07
Ground
450
450
450
450
×
×
×
○
○

Figure 8

AM ADJUSTMENT

1. Set function switch to AM.
2. Set signal generator frequency as listed in TABLE 2 MW ADJUSTMENT CHART.
3. Proceed as oulined in the TABLE 2 MW ADJUSTMENT CHART.

TABLE 2 AM ADJUSTMENT CHART

Step	Signal Generator Connection	Signal Generator Frequency	Display Frequency	Connection	Adjustment	Remarks
VDϕ	–	–	603 KHz	TP AM R101	T102	3.7V
			1602 KHz		TC12	21V
1	Test Loop	603 kHz	603 kHz	VTVM across Output	T101 (MW) Right Side	Adjust for Maximum
2	Test Loop	1404 kHz	1404 kHz	VTVM across Output	MW Aer. Trim. TC11	Adjust for Maximum
3	Repeat above steps until no futher improvement is noticed.					

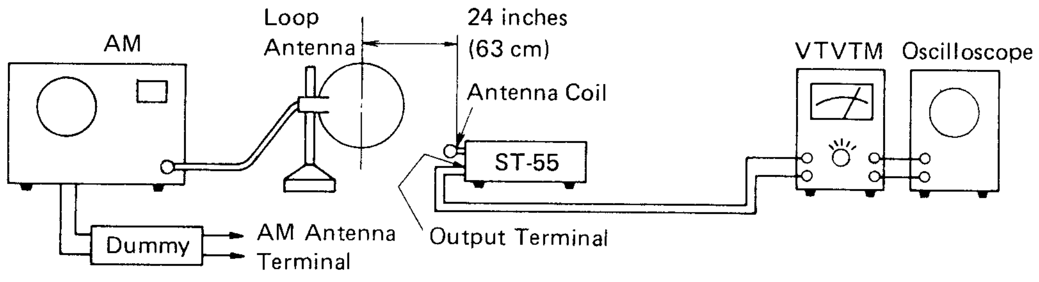
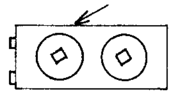
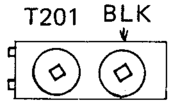

AM
Loop
Antenna
24 inches
(63 cm)
Antenna Coil
ST-55
VTVTM
Oscilloscope
Dummy
AM Antenna
Terminal
Output Terminal

Figure 9

FM IF ADJUSTMENT

1. Set function switch to FM.
2. Set signal generator frequency as listed in TABLE 4 FM IF ADJUSTMENT CHART.
3. Proceed as outlined in the TABLE 4 FM IF ADJUSTMENT CHART.

TABLE 3 FM-IF ADJUSTMENT CHART

Step	Signal Generator Connection	Signal Generator Frequency	Display Frequency	VTVM or Oscilloscope Connection	Adjustment	Remarks
1	Connect FM signal generator to FM Aerial Terminal. Connect the modulator to signal generator.	98.000 MHz 60 dB	98 MHz	Connect VTVM to R223	T201 BLK 	Adjust for Test Point FM-IF Voltage 0 V
2				VTVM across Output	T201 BLK 	Adjust for Minimum Distortion
Repeat steps 1 and 2.						
3	Connect signal generator to FM Antenna Terminal.	90.000 MHz	90 MHz	VTVM to Output	T001 T003 T002	Adjust for maximum
4		106.000 MHz	106 MHz		TC01 TC103 TC02	
Repeat steps 3 and 4.						

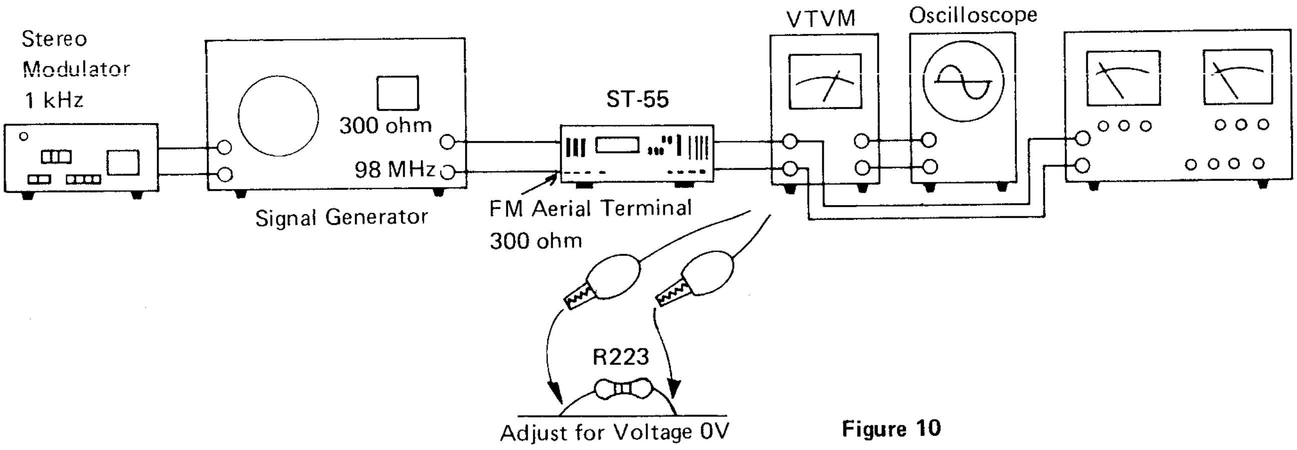

Stereo Modulator 1 kHz
Signal Generator
300 ohm
98 MHz
ST-55
FM Aerial Terminal 300 ohm
VTVM
Oscilloscope
R223
Adjust for Voltage 0V

Figure 10

FM MPX ADJUSTMENT

	Input	VTVM or Oscilloscope Connection	Adjustment	Remarks
Free-runing Frequency Adjustment	No Modulation	R304	R304	Adjust for 76 kHz

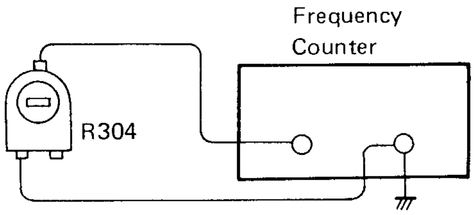

Frequency Counter
R304

Figure 11

MUTING ADJUSTMENT

Signal Generator Connection	Signal Generator Frequency	Display Frequency	Connection	Adjustment	Remarks
Connect signal generator to FM Antenna Terminal	98.000 MHz 33 ± 3 dB	98.0 MHz	VTVM to Output	R217	Signal ON. AUTO-STOP-LEVEL-VR ⇒ DX

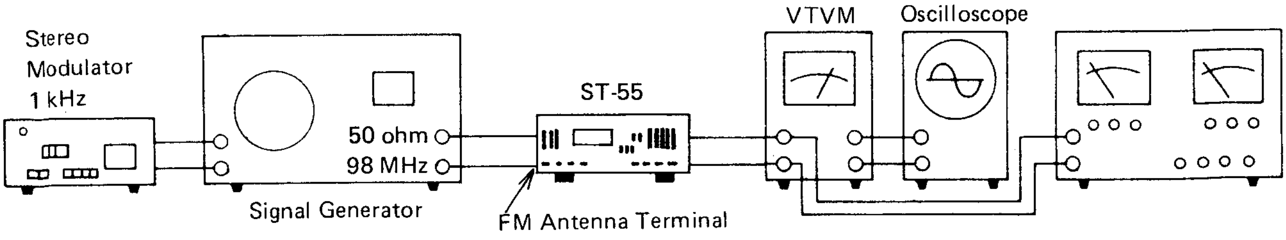

Stereo Modulator 1 kHz
Signal Generator
50 ohm
98 MHz
ST-55
FM Antenna Terminal 300 ohm
VTVM
Oscilloscope

Figure 12

TRACKING ADJUSTMENT (VD ADJUSTMENT)

Test Equipments/Tools required

1. Signal Generator (with Frequeny Counter)
2. Oscilloscope
3. DC Voltmeter
4. VTVM
5. FM Dummy Antenna (300 ohm)
6. AM Test Loop Antenna

(1) Function Switch FM Position. Mode Switch MONO Position.

Band	Step	Signal Generator Frequency	Display Frequency	Connection		Adjustment	Remarks
				Input	Output		
FM	1	88 MHz (50 dB)	88 MHz	—	Connect DC Voltmeter to JW11 and Earth	T004	Adjustment 6.5V ± 0.5
	2	108 MHz (50 dB)	108 MHz			TC04	Adjustment 12.5V ± 0.2V

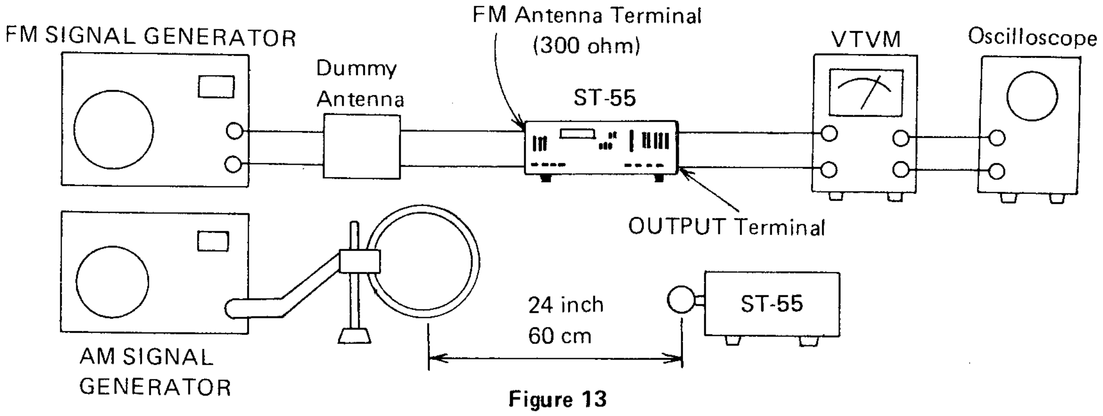

FM SIGNAL GENERATOR
Dummy Antenna
FM Antenna Terminal (300 ohm)
ST-55
VTVM
Oscilloscope
OUTPUT Terminal
AM SIGNAL GENERATOR
24 inch
60 cm
ST-55

Figure 13

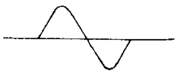
FM TOTAL ADJUSTMENT

Test Equipment/Tools required

1. Signal Generator (with Frequency Counter)
2. Oscilloscope
3. Distortion Meter
4. VTVM
5. 300 ohm FM Dummy Antenna

SENSITIVITY ADJUSTMENT

(1) FM Signal MONO 53% (40 kHz)
(2) Function Switch FM Position, Mode Switch MONO Position.

Band	Step	Signal Generator Frequency	Display Frequency	Connection		Adjustment	Remarks
				Input	Output		
FM	1	90.000 MHz (15 to 20 dB)	90.0 MHz	FM Antenna	OUTPUT Terminal	T001 T002 T003	Adjust for 3% Distortion the maximum best wave from 
	2	106.000 MHz (15 to 20 dB)	106.0 NHz			TC01 TC02 TC03	
	3	106.000 MHz	106.0 MHz			T005	Adjust for best wave without each side noise.
	4	Repeat steps 1, 2 and 3.					

SIGNAL-LED ADJUSTMENT

Band	Signal Generator Frequency	Display Frequency	Connection	Adjustment	Remarks
FM	98 MHz (60 dB)	98 MHz	FM Antenna	R219	5-LED Illuminate

DISTORTION ADJUSTMENT

(1) Memorize 98 MHz for channel 5.

FM	98 MHz (60 dB)	Channel 5	98 MHz	FM Antenna Terminal	OUTPUT Terminal	T201	Adjust for minimum distortion (0.3%) and from 400mV to 500mV VTVM. Adjust voltage between TP-2 and TP-3 for 0V.

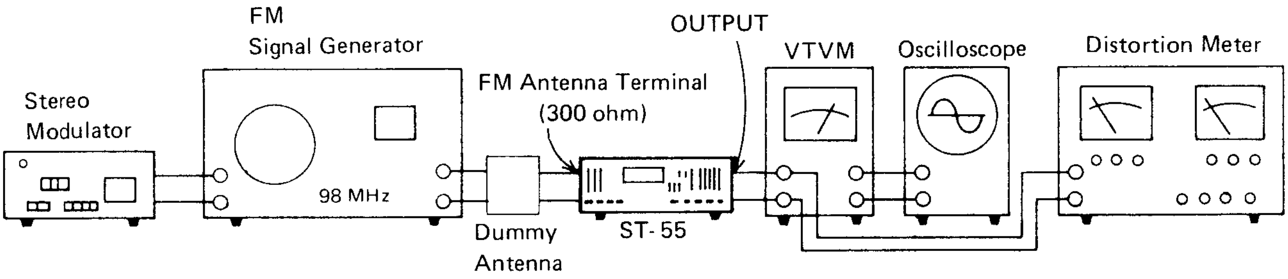

Stereo Modulator
FM Signal Generator
98 MHz
FM Antenna Terminal (300 ohm)
Dummy Antenna
ST-55
OUTPUT
VTVM
Oscilloscope
Distortion Meter

Figure 14

6. BLOCK DIAGRAM

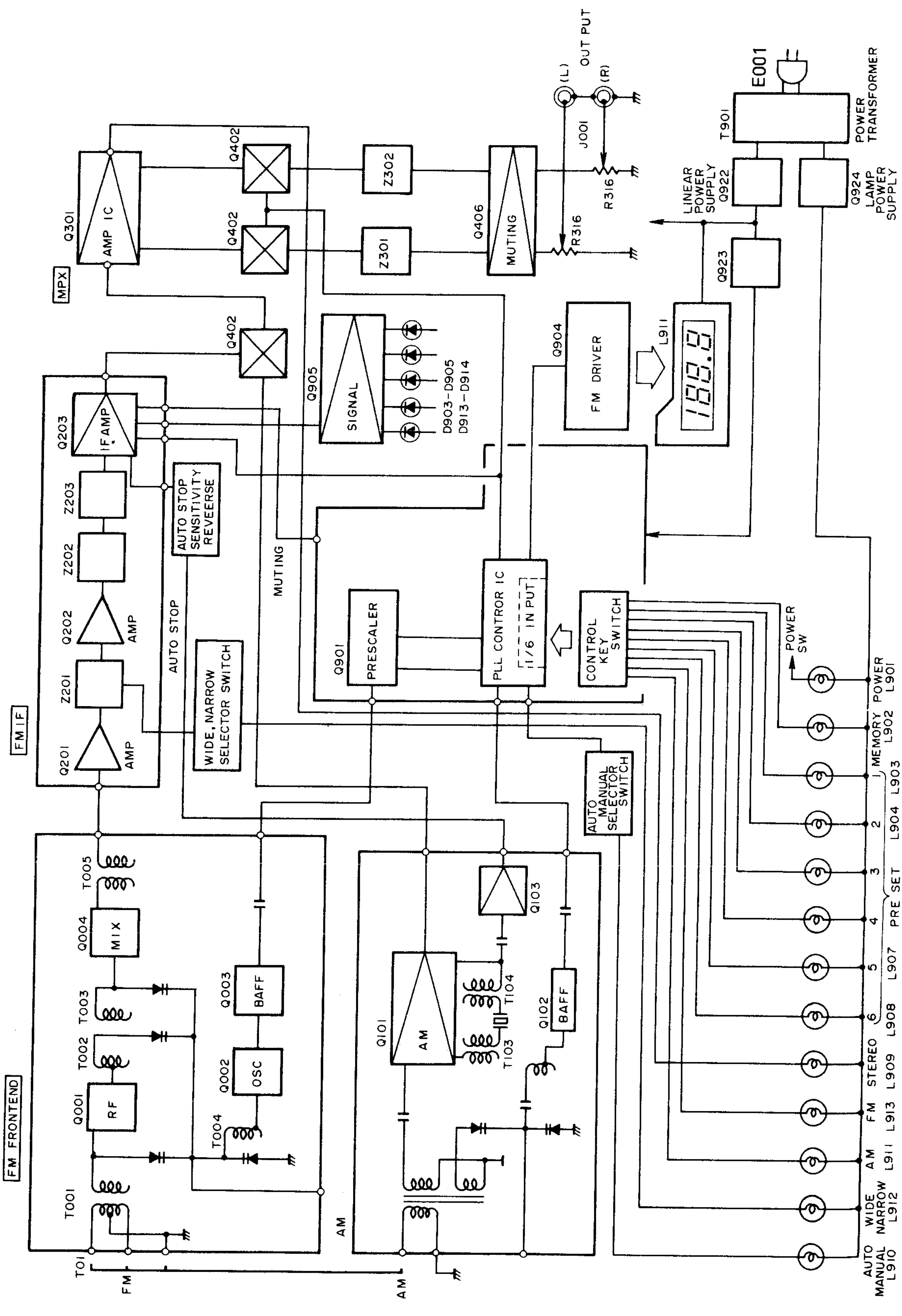
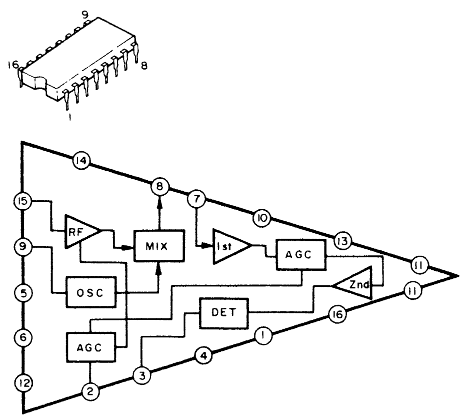

OUT PUT
(L)
(R)
J001
E001
T901
POWER TRANSFORMER
LINEAR POWER SUPPLY Q922
Q924 LAMP POWER SUPPLY
Q923
R316
Q301
AMP IC
MPX
Q402
Z302
Z301
Q406
MUTING
Q905
SIGNAL
D903-D905
D913-D914
Q904
FM DRIVER
L911
188.8
Q203
IF AMP
Z203
Z202
Q202
AMP
Z201
Q201
FM IF
AUTO STOP SENSITIVITY REVEERSE
AUTO STOP
MUTING
WIDE, NARROW SELECTOR SWITCH
Q901
PRESCALER
PLL CONTROR IC
1/6 IN PUT
CONTROL KEY SWITCH
POWER SW
AUTO MANUAL SELECTOR SWITCH
POWER L901
MEMORY L902
1 L903
2 L904
3 L905
4 L906
PRE SET
5 L907
6 L908
STEREO L909
FM L913
AM L911
WIDE NARROW L912
AUTO MANUAL L910
FM FRONTEND
T005
Q004
MIX
T003
T002
Q001
RF
T001
Q003
BAFF
Q002
OSC
T004
AM
Q103
Q101
AM
T104
T103
Q102
BAFF
T01
FM
AM

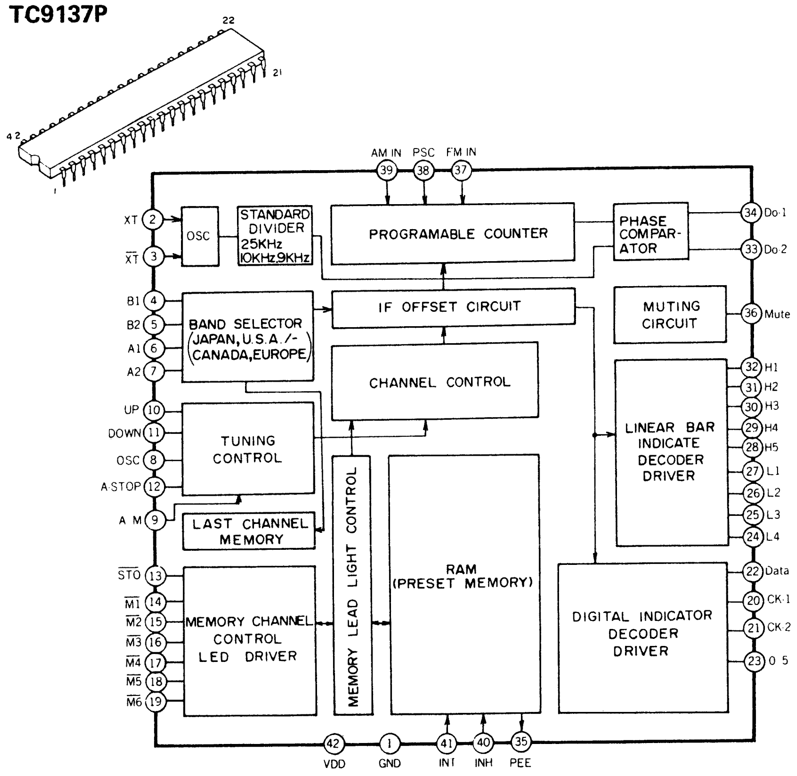
Figure 15

7. IC BLOCK DIAGRAM

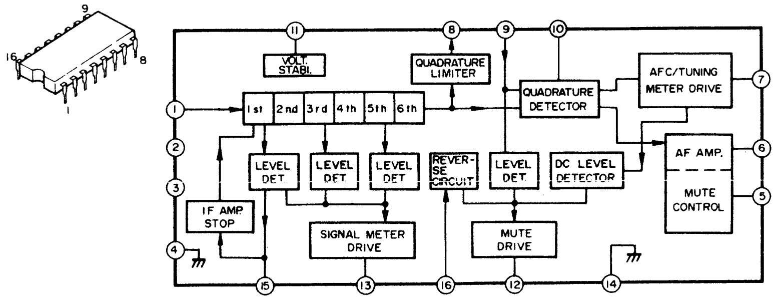
TA7616P


9
16
8
1
RF
MIX
1st
AGC
Znd
OSC
DET
AGC
14
8
7
10
13
11
11
16
1
4
3
2
15
9
5
6
12

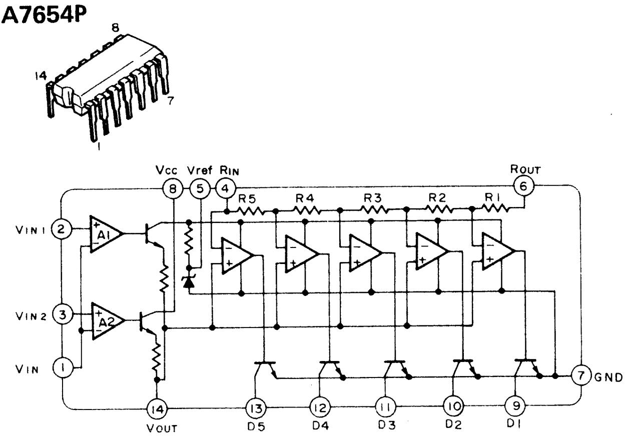
TC9137P


22
21
42
1
AM IN
PSC
FM IN
39
38
37
XT 2
XT 3
OSC
STANDARD DIVIDER 25KHz 10KHz.9KHz
PROGRAMABLE COUNTER
PHASE COMPAR-ATOR
34 Do·1
33 Do·2
B1 4
B2 5
A1 6
A2 7
BAND SELECTOR (JAPAN, U.S.A./-CANADA, EUROPE)
IF OFFSET CIRCUIT
MUTING CIRCUIT
36 Mute
CHANNEL CONTROL
UP 10
DOWN 11
OSC 8
A·STOP 12
TUNING CONTROL
LINEAR BAR INDICATE DECODER DRIVER
32 H1
31 H2
30 H3
29 H4
28 H5
27 L1
26 L2
25 L3
24 L4
A M 9
LAST CHANNEL MEMORY
MEMORY LEAD LIGHT CONTROL
RAM (PRESET MEMORY)
STO 13
M1 14
M2 15
M3 16
M4 17
M5 18
M6 19
MEMORY CHANNEL CONTROL LED DRIVER
DIGITAL INDICATOR DECODER DRIVER
22 Data
20 CK·1
21 CK·2
23 0 5
42 VDD
1 GND
41 INT
40 INH
35 PEE

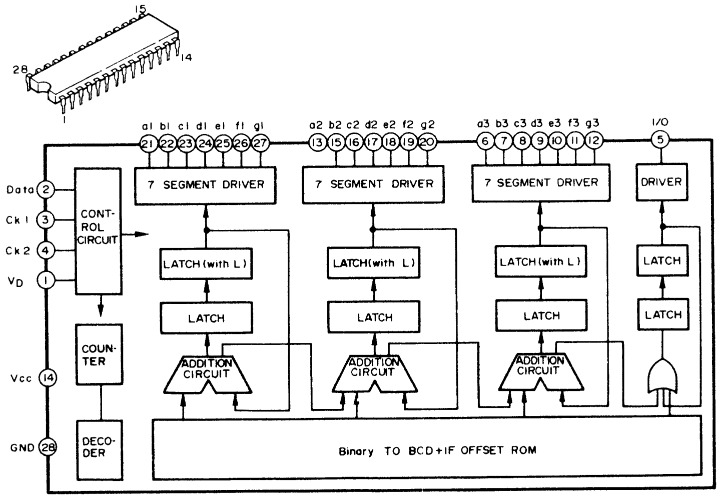
LA1231


9
16
8
1
11
8
9
10
VOLT. STABI.
QUADRATURE LIMITER
QUADRATURE DETECTOR
AFC/TUNING METER DRIVE
1st
2nd
3rd
4th
5th
6th
LEVEL DET
LEVEL DET
LEVEL DET
REVER-SE CIRCUIT
LEVEL DET
DC LEVEL DETECTOR
AF AMP.
MUTE CONTROL
IF AMP STOP
SIGNAL METER DRIVE
MUTE DRIVE
1
2
3
4
7
6
5
15
13
16
12
14

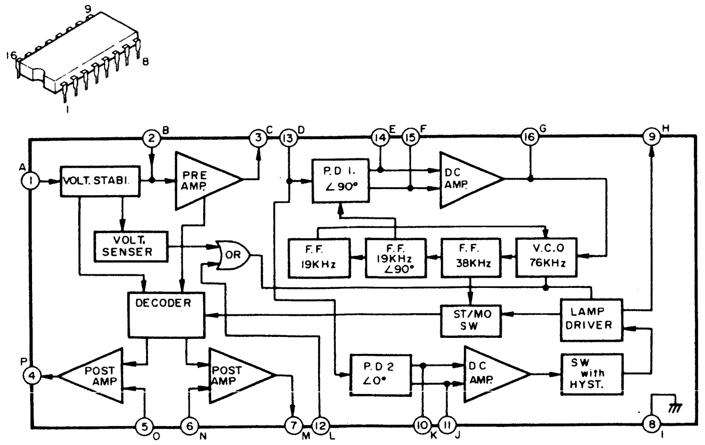
TA7654P


8
14
7
1
Vcc
Vref
RIN
8
5
4
R5
R4
R3
R2
R1
ROUT
6
VIN1 2
A1
VIN2 3
A2
VIN 1
7 GND
14
VOUT
13 D5
12 D4
11 D3
10 D2
9 D1

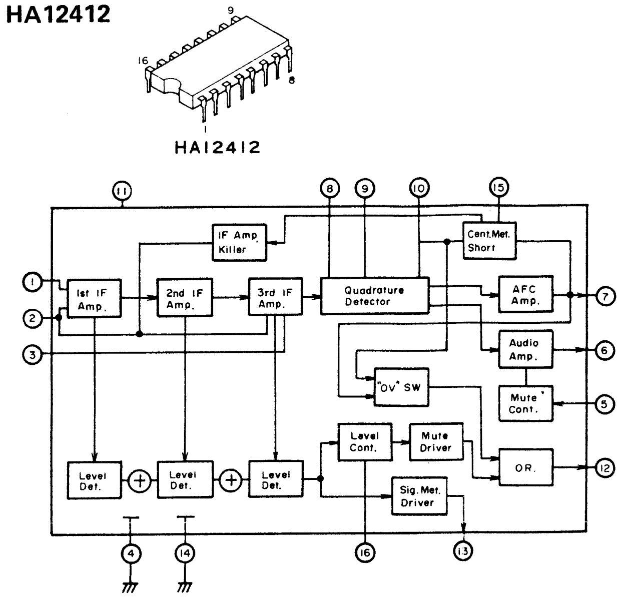
TD6301P


15
28
14
1
a1 b1 c1 d1 e1 f1 g1
21 22 23 24 25 26 27
a2 b2 c2 d2 e2 f2 g2
13 15 16 17 18 19 20
a3 b3 c3 d3 e3 f3 g3
6 7 8 9 10 11 12
I/O
5
Data 2
Ck 1 3
Ck 2 4
VD 1
Vcc 14
GND 28
CONT-ROL CIRCUIT
COUN-TER
DECO-DER
7 SEGMENT DRIVER
7 SEGMENT DRIVER
7 SEGMENT DRIVER
DRIVER
LATCH (with L)
LATCH (with L)
LATCH (with L)
LATCH
LATCH
LATCH
LATCH
LATCH
ADDITION CIRCUIT
ADDITION CIRCUIT
ADDITION CIRCUIT
Binary TO BCD+IF OFFSET ROM

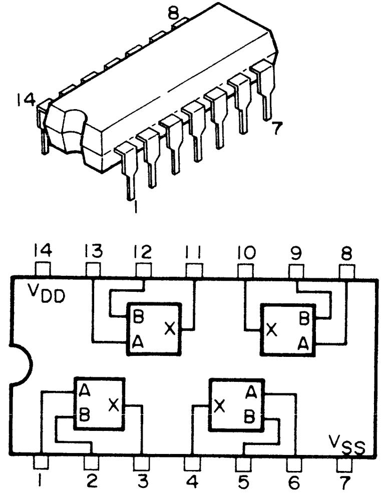
HA12016


9
16
8
1
A
1
B
2
C
3
D
13
E
14
F
15
G
16
H
9
VOLT. STABI.
PRE AMP.
P.D 1. ∠90°
DC AMP.
VOLT. SENSER
OR
F.F. 19KHz
F.F. 19KHz ∠90°
F.F. 38KHz
V.C.O 76KHz
DECODER
ST/MO SW
LAMP DRIVER
P
4
POST AMP
POST AMP
P.D 2 ∠0°
DC AMP.
SW with HYST.
5 O
6 N
7 M
12 L
10 K
11 J
8 I

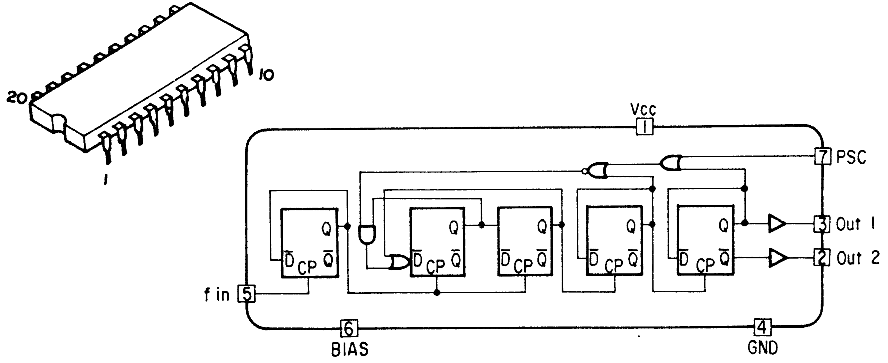
HA12412


9
16
8
1
HA12412
11
8
9
10
15
IF Amp. Killer
Cent.Met. Short
1
2
3
1st IF Amp.
2nd IF Amp.
3rd IF Amp.
Quadrature Detector
AFC Amp.
7
Audio Amp.
6
"OV" SW
Mute Cont.
5
Level Cont.
Mute Driver
OR.
12
Level Det.
Level Det.
Level Det.
Sig. Met. Driver
4
14
16
13

TC5029BP


8
14
7
1
14 13 12 11 10 9 8
VDD
B
A
X
X
B
A
A
B
X
X
A
B
VSS
1 2 3 4 5 6 7

TD6104P


11
20
10
1
Vcc
1
7 PSC
Q
D CP Q
3 Out 1
2 Out 2
f in 5
6
BIAS
4
GND

TA7324P

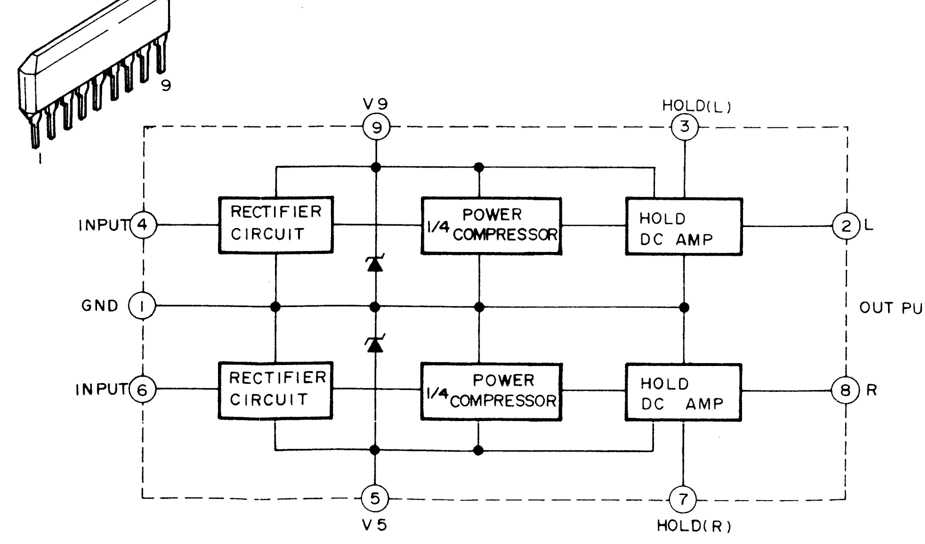
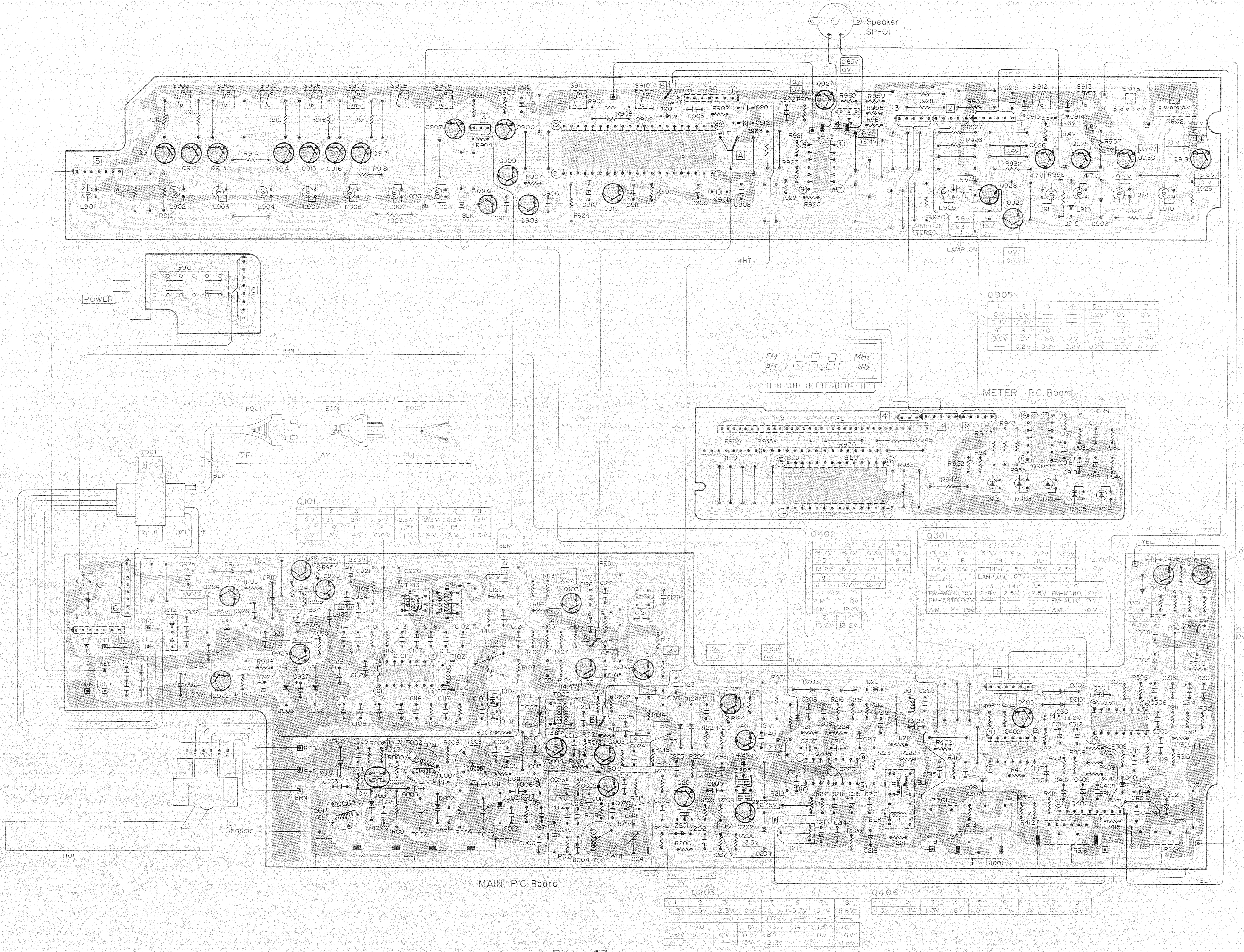

9
1
V9
9
HOLD(L)
3
INPUT 4
RECTIFIER CIRCUIT
1/4 POWER COMPRESSOR
HOLD DC AMP
2 L
GND 1
OUT PUT
INPUT 6
RECTIFIER CIRCUIT
1/4 POWER COMPRESSOR
HOLD DC AMP
8 R
5
V5
7
HOLD(R)

Figure 16

8. P.C. BOARD PARTS LOCATIONS


Speaker
SP-01
POWER
S901
E001
TE
AY
TU
T901
BRN
BLK
YEL
WHT
RED
ORG
L911
FM AM 188.88 MHz kHz
FL
METER P.C. Board
LAMP ON
STEREO
MAIN P.C. Board
To Chassis
T101
J001

Q905

1	2	3	4	5	6	7
0V	0V	—	—	1.2V	0V	0V
0.4V	0.4V	—	—	—	—	—
8	9	10	11	12	13	14
13.5V	12V	12V	12V	12V	12V	0.2V
—	0.2V	0.2V	0.2V	0.2V	0.2V	0.7V

Q101

1	2	3	4	5	6	7	8
0V	2V	2V	13V	2.3V	2.3V	2.3V	13V
9	10	11	12	13	14	15	16
0V	13V	4V	6.6V	11V	4V	2V	1.3V

Q402

1	2	3	4
6.7V	6.7V	6.7V	6.7V
5	6	7	8
13.2V	6.7V	0V	6.7V
9	10	11	
6.7V	6.7V	6.7V	
12			
FM 0V			
AM 12.3V			
13	14		
13.2V	13.2V		

Q301

1	2	3	4	5	6	
13.4V	0V	5.3V	7.6V	12.2V	12.2V	
7	8	9		10	11	
7.6V	0V	STEREO 5V		2.5V	2.5V	
—	—	LAMP ON 0.7V		—	—	
12		13	14	15	16	
FM-MONO 5V		2.4V	2.5V	2.5V	FM-MONO 0V	
FM-AUTO 0.7V		—	—	—	FM-AUTO 3V	
AM 11.9V		—	—	—	AM 0V	

Q203

1	2	3	4	5	6	7	8
2.3V	2.3V	2.3V	0V	2.1V	5.7V	5.7V	5.6V
—	—	—	—	1.0V	—	—	—
9	10	11	12	13	14	15	16
5.6V	5.7V	0V	0V	6V	—	0V	1.6V
—	—	—	5V	2.3V	—	—	0.6V

Q406

1	2	3	4	5	6	7	8	9
1.3V	3.3V	1.3V	1.6V	0V	2.7V	0V	0V	0V

Figure 17

9. SCHEMATIC DIAGRAM

CAUTION:
The ⚠ mark, the symbol No. circlued with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

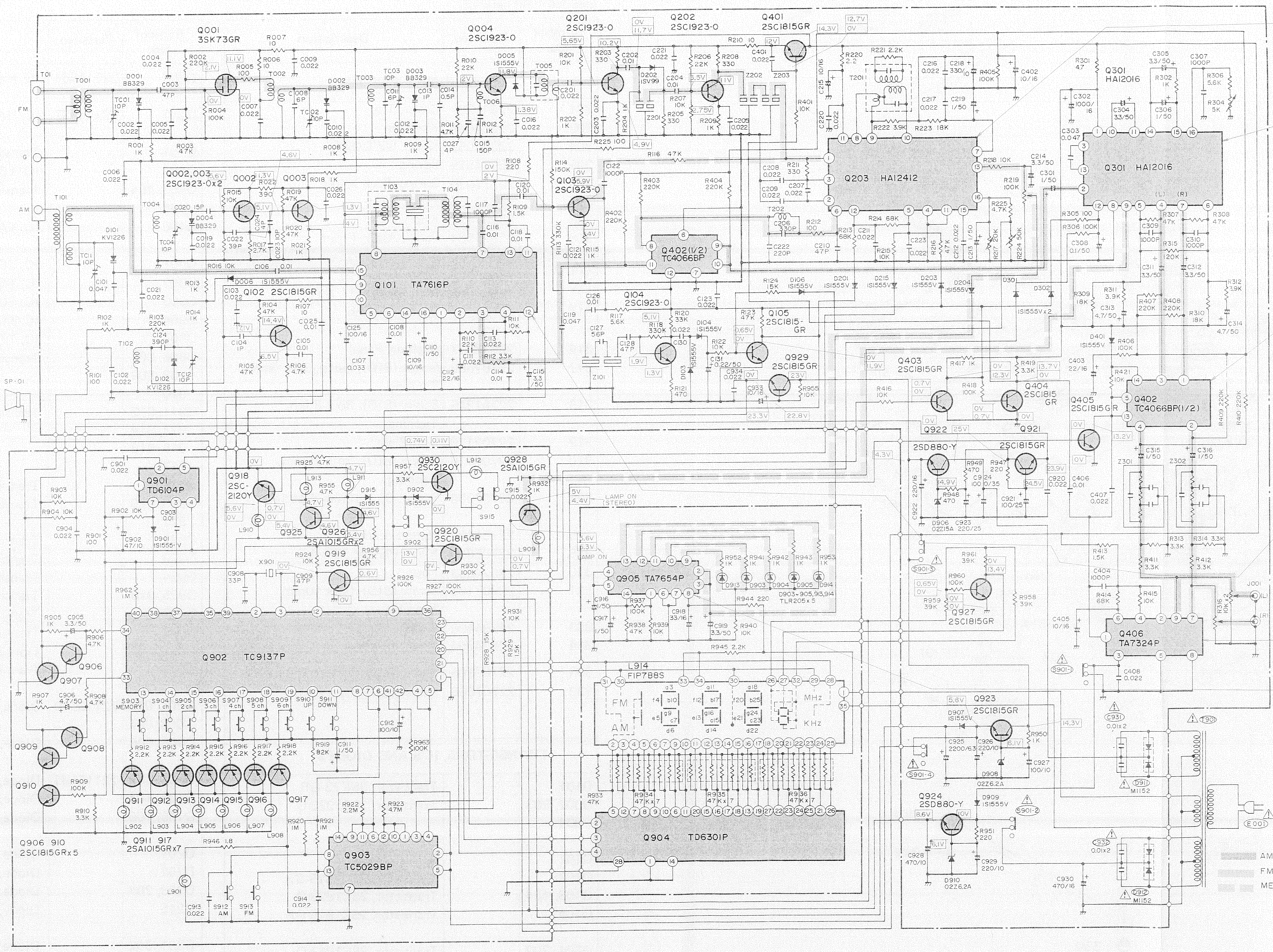

FM
G
AM
SP-01
T01
T001
T101
Q001 3SK73GR
Q002,003 2SC1923-0x2
Q004 2SC1923-0
Q101 TA7616P
Q102 2SC1815GR
Q103 2SC1923-0
Q104 2SC1923-0
Q105 2SC1815-GR
Q201 2SC1923-0
Q202 2SC1923-0
Q203 HA12412
Q301 HA12016
Q401 2SC1815GR
Q402(1/2) TC4066BP
Q402 TC4066BP(1/2)
Q403 2SC1815GR
Q404 2SC1815 GR
Q405 2SC1815GR
Q406 TA7324P
Q901 TD6104P
Q902 TC9137P
Q903 TC5029BP
Q904 TD6301P
Q905 TA7654P
Q906 910 2SC1815GRx5
Q911 917 2SA1015GRx7
Q918 2SC-2120Y
Q919 2SC1815GR
Q920 2SC1815GR
Q921
Q922
2SD880-Y
Q923 2SC1815GR
Q924 2SD880-Y
Q925 Q926 2SA1015GRx2
Q927 2SC1815GR
Q928 2SA1015GR
Q929 2SC1815GR
Q930 2SC2120Y
FIP788S
J001 (L) (R)
E001
LAMP ON (STEREO)
LAMP ON
S901 S902 S903 MEMORY S904 1ch S905 2ch S906 3ch S907 4ch S908 5ch S909 6ch S910 UP S911 DOWN S912 AM S913 FM S915
AM Signal Path.(L ch.)
FM Signal Path.(R ch.)
METER Signal Path.

Figure 18

Q203

1	2	3	4
2.3V	2.3V	2.3V	0V
5	6	7	8
2.1V	5.7V	5.7V	5.6V
1.0V	——	——	——
9	10	11	12
5.6V	5.7V	0V	0V
——	——	——	5 V
13	14	15	16
6 V	——	0V	1.6V
2.3V	——	——	0.6V

Q301

1	2	3	4	5
13.4V	0V	5.3V	7.6V	12.2V
6	7	8	9	
12.2V	7.6V	0V	STEREO 5V	
——	——	——	LAMP ON 0.7V	
10	11	12		
2.5V	2.5V	FM - MONO 5 V		
——	——	FM - AUTO 0.7V		
——	——	AM 11.9V		
13	14	15	16	
2.4V	2.5V	2.5V	FM-MONO 0V	
——	——	——	FM-AUTO 3V	
——	——	——	AM 0V	

Q402

1	2	3	4	5
6.7V	6.7V	6.7V	6.7V	13.2V
6	7	8	9	10
6.7	0V	6.7V	6.7V	6.7V
11	12	13	14	
6.7V	FM 0V	13.2V	13.2V	
——	AM 12.3V	——	——	

FM
AM

Q101

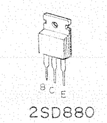
1	2	3	4	5
0V	2V	2V	13V	2.3V
6	7	8	9	10
2.3V	2.3V	13V	0V	13V
11	12	13	14	15
4 V	6.6V	11V	4V	2 V
16				
1.3 V				

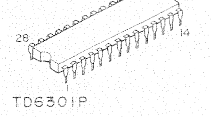
Q406

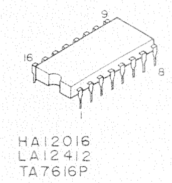
1	2	3	4	5
1.3 V	3.3V	1.3V	1.6V	0V
6	7	8	9	
2.7V	0V	0V	0V	

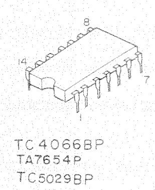
Q905

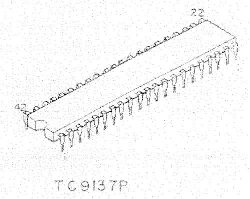
1	2	3	4	5
0V	0V	——	——	1.2V
0.4V	0.4V	——	——	——
6	7	8	9	10
0V	0V	13.5V	12V	12V
——	——	——	0.2V	0.2V
11	12	13	14	
12V	12V	12V	0.2V	
0.2V	0.2V	0.2V	0.7V	

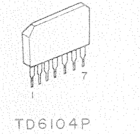


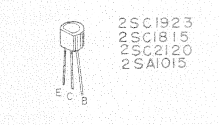

28
15
14
TD6301P

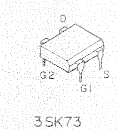

16
9
8
HA12016
LA12412
TA7616P

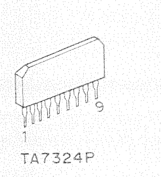

14
8
7
TC4066BP
TA7654P
TC5029BP






2SC1923
2SC1815
2SC2120
2SA1015
E C B


D
G2 S
G1
3SK73



1. S901: Push Switch (Power) . . . . OFF Position
2. S902: Push Switch (AUTO/STEREO MUTING, MANUAL/MONO). . MANUAL/MONO Position
3. S903: Key Switch (Memory) . . . . OFF Position
4. S904 ∿ 909: Key Switch (FM/AM PRESET) 1 ch. ∿ 6 ch. . . . . OFF Position
5. S910: Key Switch (Up) . . . . OFF Position
6. S911: Key Switch (Down) . . . . OFF Position
7. S912: Key Switch (AM) . . . . OFF Position
8. S913: Key Switch (FM) . . . . OFF Position
9. S915: Push Switch (IF Band Select) . . . . OFF Position

10. CABINET EXPLODED VIEW

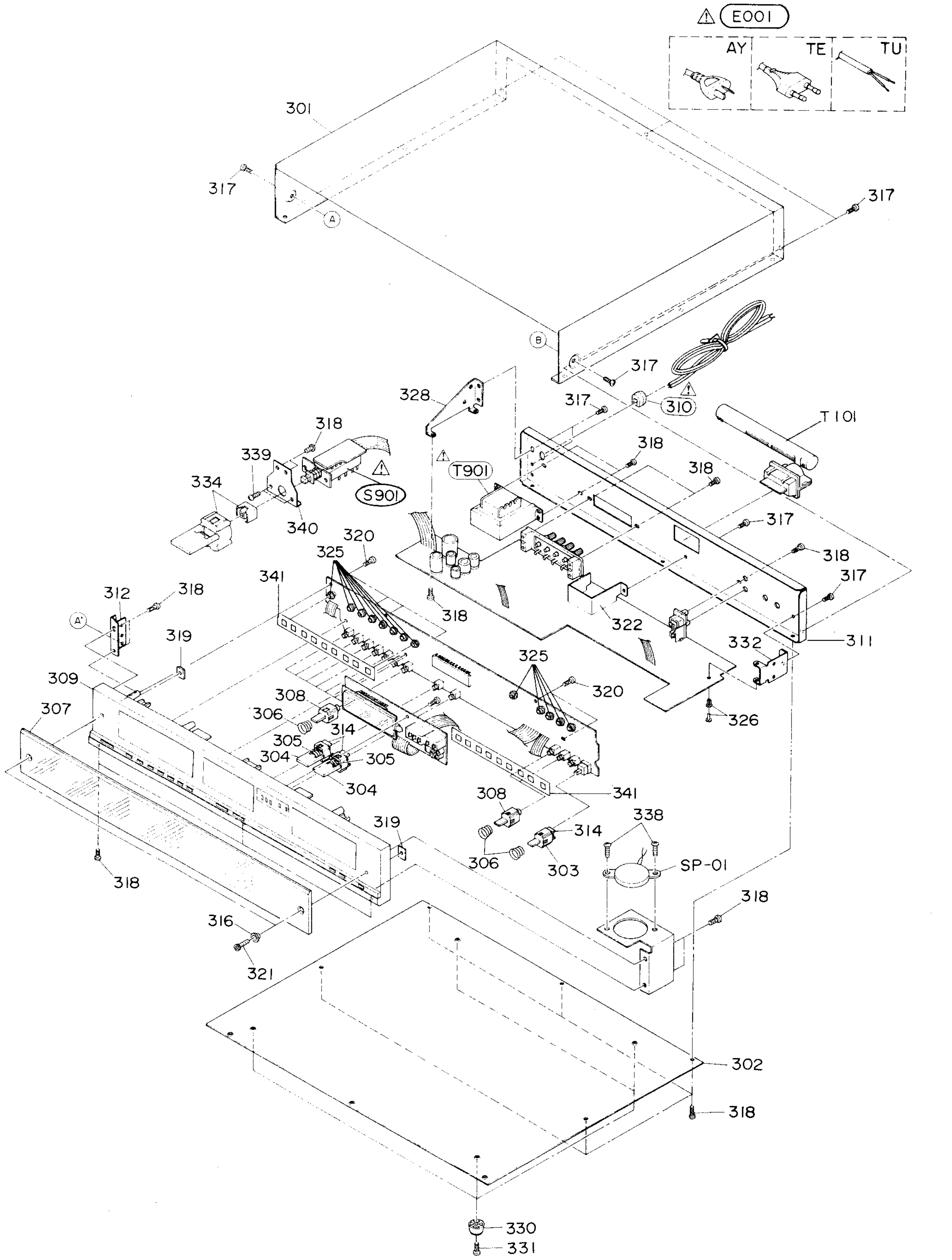


Figure 19

Note: The parts without Key No. on this exploded parts list are unserviceable parts.

11. PARTS LIST

CAUTION:
The ⚠ mark, the symbol No. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

Symbol No.	Parts No.	Description
CABINET PARTS		
301	22841267	Cover, Top
303	22884046	Knob, B
304	22884059	Knob, UP/DOWN
305	25772529	Spring
306	25777030	Spring, Push Knob
307	25832455	Front Glass
308	25837472	Knob, Push
309	22821584	Panel, Ass'y, Front
⚠ 310	25845528	Bush, Cord
311	25838566	Plate, Jack (TE)
311	25838606	Plate, Jack (TU, AY)
314	22758282	Spacer, Switch
316	22833517	Bushing, Panel
317	22707682	Screw (BID), Earth, 3ϕ x 6mm, Tapping
318	22701326	Screw (BID), 3ϕ x 8mm, Tapping
319	22702179	Nut, Plate
320	22707116	Screw (BID), 3ϕ x 10mm, Tapping
321	22707660	Screw, 3ϕ x 10mm, Special
325	22751192	Holder, Lamp
326	22705020	Rivet, Plastic, 3ϕ x 4.5 mm
330	22874033	Foot
331	22707165	Screw (BID), 3ϕ x 10mm, Tapping
333	25764400	Washer, 3ϕ
334	22824354	Knob, Power
338	22707265	Screw,(BID),2ϕ x 4mm
339	22707066	Screw,(BID),3ϕ x 6mm
TRANSISTORS, IC'S AND DIODES		
Q101		Transistor, 3SK73-GR
Q002, 003 004		Transistor, 2SC1923-O
Q101		IC, TA7616P
Q102		Transistor, 2SC1815-GR
Q103, 104		Transistor, 2SC1923-O
Q105		Transistor, 2SC1815-GR
Q201, 202		Transistor, 2SC1923-O
Q203	22114864	IC, HA12412
Q301	22114837	IC, HA12016
Q401		Transistor, 2SC1815-GR
Q402		IC, TC4066BP
Q403, 404 405		Transistor, 2SC1815-GR
Q406		IC, TA7324P
Q901		IC, TD6104P
Q902		IC, TC9137P
Q903		IC, TC5029BP
Q904		IC, TD6301P
Q905		IC, TA7654P
Q906, 907 908, 909 910		Transistor, 2SC1815-GR
Q911, 912 913, 914 915, 916 917		Transistor, 2SA1015-GR
Q918		Transistor, 2SC2120-Y
Q919, 920 921		Transistor, 2SC1815-GR
Q922		Transistor, 2SD880-Y
Q923		Transistor, 2SC1815-GR
Q924		Transistor, 2SD880-Y
Q925, 926		Transistor, 2SA1015-Y
Q927		Transistor, 2SC1815-GR
Q928		Transistor, 2SC1015-GR
Q929		Transistor, 2SC1815-GR
Q930		Transistor, 2SC2120-Y
D001, 002 003, 004	22115610	Diode, BB329
D005, 006		Diode, 1S1555V
D101, 102	22115599	Diode, KV1226
D103, 104		Diode, 1S1555V
D105, 106		Diode, 1S1555V
D201		Diode, 1S1555V
D202		Diode, 1SV99
D203, 204		Diode, 1S1555V
D215		Diode, 1S1555V
D301, 302		Diode, 1S1555V

Symbol No.	Parts No.	Description
D401		Diode, 1S1555V
D901, 902		Diode, 1S1555V
D903, 904		Diode, TLR205
905		
D906		Diode, 02Z15A
D907		Diode, 1S1555V
D908		Diode, 02Z6.2A
D909		Diode, 1S1555V
D910		Diode, 0226.2A
⚠ D911, 912	22115427	Diode, MI-152
D913, 914		Diode, TLR205
D915		Diode, 1S1555V

COILS AND TRANSFORMERS

Symbol No.	Parts No.	Description
T001	22292115	Coil, RT51S2115
T002	22294338	Coil, RT61S4338
T003	22294367	Coil, RT61S4367
T004	22295121	Coil, RT71S5121
T005	22265727	IF Transformer, IT16S5727
T006	22291049	Coil, RF
T101	22242746	Coil, Antenna, FA32-2746A
T102	22245318	Coil, RT712S5318
T103	22153154	IF Transformer, SFL450B
T104	22264808	IF Transformer, IT15M4808
T201	22267386	IF Transformer, IT10S7386
T202	22232219	Coil, 8.85mH
⚠ T901	22223872	Transformer, Power

ELECTRICAL PARTS

Symbol No.	Parts No.	Description
⚠ S901	22195872	Switch, Push, Power
S902	22195606	Switch, Push, AUTO/MONO
S903	22195461	Switch, Key, MEMORY
S904∿909		Switch, Key, 1 ch ~ 6 ch
S910		UP
S911		DOWN
S912		AM
S913		FM
S915	22195606	Switch, Push, IF Band Select
Z101	22153175	Filter, Ceramic, SFZ450G
Z201, 202	22153124	Filter, Ceramic, SFE10.7MHz
203		
Z301, 302	22212058	Filter, Low-pass

Symbol No.	Parts No.	Description
X901	22153141	Crystal, 7.2MHz
L901, 902	22113518	Lamp, 6V, 100mA
903, 904		
905, 906		
907, 908		
909, 910		
911, 912		
913		
L914	22104548	Display Tube, FIP7B8BS
J001	22163821	Jack, US2P
T01	22162468	Terminal, Antenna, 4P
SP-01	22152354	Buzzer, Piezo-Electric, 3 cm
⚠ E001	22176286	Cord, Power (TE)
⚠ E001	22176536	Cord, Power (TU)
⚠ E001	22176588	Cord, Power (AY)

CAPACITORS

D = ±0.5pF, J = ±5%, K = ±10%, M = ±20%, Z = –20 +80%
ABBREVIATIONS: CD = Ceramic Disk, EL = Electrolytic,
PP = Polypropylene, BL = Barrier Layer

Symbol No.	Parts No.	Description
TC01, 02	22309157	Trimer, CON
03, 04		
TC11, 12	22309149	Trimer, CON2R
C002	22342223	CD, 0.022mfd, 50V, Z
C003	22362470	CD, 47pF, 50V, K
C004, 005	22342223	CD, 0.022mfd, 50V, Z
006, 007		
C008	22361609	CD, 6pF, 50V, D
C009, 010	22342223	CD, 0.022mfd, 50V, Z
C011	22361609	CD, 6pF, 50V, D
C012	22342223	CD, 0.022mfd, 50V, Z
C013	22361109	CD, 1pF, 50V, D
C014	22361508	CD, 0.5pF, 50V, D
C015	22349151	CD, 150pF, 50V, K
C016, 017	22342223	CD, 0.022mfd, 50V, Z
C019	22342223	CD, 0.022mfd, 50V, Z
C020	22362150	CD, 15pF, 50V, K
C021	22342223	CD, 0.022mfd, 50V, Z
C022	22360137	CD, 39pF, 50V, J, CH
C023	22361100	CD, 10pF, 50V, D
C024	22361409	CD, 4pF, 50V, D
C025	22342103	CD, 0.01mfd, 50V, Z
C026	22342223	CD, 0.022mfd, 50V, Z
C027	22361409	CD, 4pF, 50V, D
C101	22360552	BL, 0.047mfd, 25V, K
C102, 103	22342223	CD, 0.022mfd, 50V, Z
C104	22361109	CD, 1pF, 50V, D

Symbol No.	Parts No.	Description
C105, 106	22342103	CD, 0.01mfd, 50V, Z
C107	22360550	BL, 0.033mfd, 25V, K
C109	22485100	EL, 10mfd, 16V, M
C110	22488109	EL, 1mfd, 50V, M
C111	22342223	CD, 0.022mfd, 50V, Z
C112	22485220	EL, 22mfd, 16V, M
C113	22342223	CD, 0.022mfd, 50V, Z
C114	22342103	CD, 0.01mfd, 50V, Z
C115	22488339	EL, 3.3mfd, 50V, M
C116	22342103	CD, 0.01mfd, 50V, Z
C117	22349102	CD, 1000pF, 50V, K
C118	22342103	CD, 0.01mfd, 50V, Z
C119	22360552	BL, 0.047mfd, 25V, K
C120	22342103	CD, 0.01mfd, 50V, Z
C121	22342223	CD, 0.033mfd, 50V, Z
C122	22349102	CD, 1000pF, 50V, K
C123	22342223	CD, 0.022mfd, 50V, Z
C124	22321051	PP, 390pF, 50V, J
C125	22485101	EL, 100mfd, 16V, M
C126	22342103	CD, 0.01mfd, 50V, Z
C127	22362560	CD, 56pF, 50V, K
C128	22342103	CD, 0.01mfd, 50V, Z
C130	22342223	CD, 0.022mfd, 50V, Z
C131	22488228	EL, 0.22mfd, 50V, M
C201	22342223	CD, 0.022mfd, 50V, Z
C202	22342103	CD, 0.01mfd, 50V, Z
C203	22342223	CD, 0.022mfd, 50V, Z
C204	22342103	CD, 0.01mfd, 50V, Z
C205	22342223	CD, 0.022mfd, 50V, Z
C206	22362331	CD, 330pF, 50V, K
C207, 208 209, 211 212	22342223	CD, 0.022mfd, 50V, Z
C210	22362470	CD, 47pF, 50V, K
C213	22488109	EL, 1mfd, 50V, M
C214	22488339	EL, 3.3mfd, 50V, M
C215	22485100	EL, 10mfd, 16V, M
C216, 217	22342223	CD, 0.022mfd, 50V, Z
C218	22483331	EL, 330mfd, 10V, M
C219	22488109	EL, 1mfd, 50V, M
C220, 221	22342223	CD, 0.022mfd, 50V, Z
C222	22362221	CD, 220pF, 50V, K
C223	22342223	CD, 0.022mfd, 50V, Z
C301	22488109	EL, 1mfd, 50V, M
C302	22485102	EL, 1000mfd, 16V, M
C303	22360552	BL, 0.047mfd, 25V, K
C304, 305	22488339	EL, 3.3mfd, 50V, M
C306	22488109	EL, 1mfd, 50V, M
C307	22321057	PP, 1000pF, 50V, J
C308	22488108	EL, 0.1mfd, 50V, M
C309, 310	22321057	PP, 1000pF, 50V, J
C311, 312	22488339	EL, 3.3mfd, 50V, M

Symbol No.	Parts No.	Description
C313, 314	22488479	EL, 4.7mfd, 50V, M
C315, 316	22488109	EL, 1mfd, 50V, M
C401	22342223	CD, 0.022mfd, 50V, Z
C402	22485100	EL, 10mfd, 16V, M
C403	22485220	EL, 22mfd, 16V, M
C404	22349102	CD, 1000pF, 50V, K
C405	22485100	EL, 10mfd, 16V, M
C406	22342103	CD, 0.01mfd, 50V, Z
C407, 408	22342223	CD, 0.022mfd, 50V, Z
C901	22342223	CD, 0.022mfd, 50V, Z
C902	22483470	EL, 47mfd, 10V, M
C903	22342103	CE, 0.01mfd, 50V, Z
C904	22342223	CD, 0.022mfd, 50V, Z
C905	22488339	EL, 3.3mfd, 50V, M
C906	22488479	EL, 0.47mfd, 50V, M
C907	22342223	CD, 0.022mfd, 50V, Z
C908	22362330	CD, 33pF, 50V, K
C909	22362470	CD, 47pF, 50V, K
C911	22488109	EL, 1mfd, 50V, M
C912	22483101	EL, 100mfd, 10V, M
C913, 914 915	22342223	CD, 0.022mfd, 50V, Z
C916, 917	22488109	EL, 1mfd, 50V, M
C918	22485330	EL, 33mfd, 16V, M
C919	22488339	EL, 3.3mfd, 50V, M
C920	22342223	CD, 0.022mfd, 50V, Z
C921	22486221	EL, 220mfd, 25V, M
C922	22485221	EL, 220mfd, 16V, M
C923	22486221	EL, 220mfd, 25V, M
C924	22487102	EL, 1000mfd, 35V, M
C925	22482222	EL, 2200mfd, 6.3V, M
C926	22483221	EL, 220mfd, 10V, M
C927	22483101	EL, 100mfd, 10V, M
C928	22483471	EL, 470mfd, 10V, M
C929	22483221	EL, 220mfd, 10V, M
C930	22485471	EL, 470mfd, 16V, M
⚠ C931, 932	22340148	CD, 0.01mfd x 2, AC500V
C933	22485100	EL, 10mfd, 16V, M
C934	22342223	CD, 0.022mfd, 50V, Z

RESISTORS

All resistors are carbon film 1/4W, ±5%, unless otherwise noted. K = 1000, M = 1000000

R001	22545102	1K ohm
R002	22555224	220K ohm
R003	22555473	47K ohm

Symbol No.	Parts No.	Description
R004	22555104	100K ohm
R005	22555101	100 ohm
R006, 007	22555100	10 ohm
R008	22545102	1K ohm
R009	22555102	1K ohm
R010	22545223	22K ohm
R011	22555472	4.7K ohm
R012, 013	22555102	1K ohm
R014	22545102	1K ohm
R015, 016	22555103	10K ohm
R017	22555272	2.7K ohm
R018	22555102	1K ohm
R019, 020	22555473	47K ohm
R021	22555102	1K ohm
R022	22555391	390 ohm
R101, 102	22555102	1K ohm
R103	22555224	220K ohm
R104, 105	22555473	47K ohm
R106	22555472	4.7K ohm
R107	22545100	10 ohm
R108	22545221	220 ohm
R109	22555152	1.5K ohm
R110	22555223	22K ohm
R111	22555103	10K ohm
R112	22555332	3.3K ohm
R113	22555334	330K ohm
R114	22555154	150K ohm
R115	22555102	1K ohm
R116	22545473	47K ohm
R117	22555562	5.6K ohm
R120	22555333	33K ohm
R121	22555471	470 ohm
R122	22555103	10K ohm
R123	22555473	47K ohm
R124	22555562	5.6K ohm
R201	22555103	10K ohm
R202	22555102	1K ohm
R203	22555331	330 ohm
R204	22555102	1K ohm
R205	22555331	330 ohm
R206	22555223	22K ohm
R207	22555103	10K ohm
R208	22555331	330 ohm
R209	22555102	1K ohm
R210	22545100	10 ohm
R211	22555331	330 ohm
R212	22555101	100 ohm
R213	22545683	68K ohm
R214	22555683	68K ohm

Symbol No.	Parts No.	Description
R215	22555103	10K ohm
R216	22555473	47K ohm
R217	22658493	20K ohm, Semi-fixed
R218	22555103	10K ohm
R219	22658495	100K ohm, Semi-fixed
R220	22555229	2.2 ohm
R221	22555222	2.2K ohm
R222	22555392	3.9K ohm
R223	22545183	18K ohm
R224	22625425	50K ohm, B, Variable
R225	22555472	4.7K ohm
R301	22545479	4.7 ohm
R302	22555102	1K ohm
R303	22555562	5.6K ohm
R304	22658513	5K ohm, Semi-fixed
R305	22555101	100 ohm
R306	22555104	100K ohm
R307, 308	22555473	47K ohm
R309, 310	22555183	18K ohm
R311, 312	22555392	3.9K ohm
R313, 314	22555332	3.3K ohm
R315	22555124	120K ohm
R316	22622426	10K ohm, B, Variable
R401	22545103	10K ohm
R402, 403 404	22555224	220K ohm
R405, 406	22555104	100K ohm
R407, 408	22555224	220K ohm
409, 410	22555332	3.3K ohm
R411, 413	22555442	3.3K ohm
R414	22555683	68K ohm
R415, 416	22555103	10K ohm
R417	22555102	1K ohm
R418	22555104	100K ohm
R419	22555332	3.3K ohm
R420	22545104	100K ohm
R421	22555103	10K ohm
R901	22555101	100 ohm
R902, 903 904	22555103	10K ohm
R905	22555102	1K ohm
R906	22545472	4.7K ohm
R907	22555102	1K ohm
R908	22545472	4.7K ohm
R909	22545104	100K ohm
R910	22545332	3.3K ohm
R912	22545222	2.2K ohm
R913, 914 915, 916 917, 918	22545222	2.2K ohm

Symbol No.	Part No.	Description
R919	22555823	82K ohm
R920, 921	22555105	1M ohm
R922	22555225	2.2M ohm
R923	22555475	4.7M ohm
R924	22545103	10K ohm
R925	22545472	4.7K ohm
R926, 927	22545104	100K ohm
R928	22545153	15K ohm
R929	22545152	1.5K ohm
R930	22545104	100K ohm
R931	22545103	10K ohm
R932	22545102	1K ohm
R933	22545473	47K ohm
R934, 935 936	22450550	47K ohm x 7, Composite Part
R937	22555104	100K ohm
R938	22555473	47K ohm
R939, 940	22555103	10K ohm
R941	22555102	1K ohm
R942, 943	22545102	1K ohm
R944	22545221	220 ohm
R945	22545222	2.2K ohm
R946	22545198	1.8 ohm
R947	22555221	220 ohm

Symbol No.	Part No.	Description
R948, 949	22555471	470 ohm
R950	22555102	1K ohm
R951	22555221	220 ohm
R952, 953	22545102	1K ohm
R955, 956	22555472	4.7K ohm
R957	22545332	3.3K ohm
R958, 959	22555393	39K ohm
R960	22555104	100K ohm
R961	22555393	39K ohm
R962	22555105	1M ohm
R963	22545104	100K ohm

ACCESSORIES

Symbol No.	Part No.	Description
AC01	22124701	Antenna Feeder Ass'y
AC02	22170109	Cord, Joint
AC03	22902826	Owner's Manual

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